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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* DALE K. BELL

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Appeal 2008-1852  
Application 09/981,238  
Technology Center 3600

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Decided: September 23, 2008

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Before MURRIEL E. CRAWFORD, JENNIFER D. BAHR, and JOSEPH A.  
FISCHETTI, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Dale K. Bell (Appellant) appeals under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1-8, 10, 11, and 14, which are the only pending claims. We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

*The Invention*

Appellant's claimed invention is directed to a drive axle assembly, and more particularly, a bearing cage seal (Specification 1, ¶ 1). The essence of Appellant's invention is the provision of a seal that separates the axle housing into a first cavity, in which the bearing assembly is arranged, and a second cavity, in which the differential is arranged (Specification 2, ¶4). With such an arrangement, a lubricant containing GL5 or similar additive may be placed into the second cavity to lubricate the differential, and another lubricant, without the GL5 additive, may be placed in the first cavity to lubricate the bearing assembly. *Id.*

Claims 1 and 11, reproduced below, are the only independent claims involved in this appeal.

1. A drive axle assembly comprising:
  - an axle housing;
  - coaxial axle shafts supported at least partially within said axle housing;
  - a driven shaft supported at least partially within said axle housing, and transverse to said coaxial axle shafts;
  - a gear assembly disposed within said axle housing coupling said coaxial axle shafts and said driven shaft, wherein said gear assembly includes a differential coupling said coaxial axle shafts and said driven shaft to permit relative rotation between said coaxial axle shafts;
  - a bearing assembly supporting said driven shaft in said axle housing;
  - a first seal interposed between said driven shaft and said axle housing adjacent to said bearing assembly, said first seal separating said axle

housing into first and second cavities with said bearing assembly and said gear assembly respectively disposed therein;

a first lubricant in said first cavity lubricating said bearing assembly; and

a second lubricant of a composition different than said first lubricant in said second cavity lubricating said gear assembly.

11. A drive axle bearing cage assembly comprising:

a bearing cage;

a driven shaft supported by said bearing cage, said driven shaft having a yoke at one end and a pinion at another end opposite said yoke;

a bearing assembly supporting said driven shaft in said bearing cage between said yoke and said pinion, said bearing assembly including at least one cup affixed to said bearing cage and at least one cone affixed to said driven shaft with rolling elements circumferentially located relative to one another by a retainer and arranged between said at least one cup and said at least one cone;

a first seal interposed between said driven shaft and said bearing cage adjacent to said yoke;

a second seal interposed between said driven shaft and said bearing cage adjacent to said pinion; and

wherein said first and second seals are interposed between and in engagement with said bearing cage and said at least one cone.

### *The Rejections*

Appellant seeks review of the Examiner's rejections under 35 U.S.C. § 103(a) of claims 1-7, 10, 11, and 14 as unpatentable over Glaze (US 4,754,847, issued Jul. 5, 1988) in view of Miller (US 5,492,419, issued Feb. 20, 1996) and claim 8 as unpatentable over Glaze in view of Miller and Tersigni (US 5,763,372, issued Jun. 9, 1998).

### THE ISSUES

The first issue for our review is whether Appellant demonstrates that the Examiner erred in determining that it would have been obvious to modify the axle differential assembly of Glaze to provide a second seal to separate the axle differential housing into a first cavity housing the bearing assembly and a second cavity housing the gear assembly as taught by Miller, as called for in claim 1.

The second issue presented is whether either Glaze or Miller teaches two chambers receiving lubricants of a distinct composition, as called for in claim 1.

A third issue is whether the axle differential assembly of Glaze as modified in view of Miller as proposed by the Examiner satisfies the limitation in claim 3 that the bearing cage is a pinion bearing cage, the limitation in claim 4 that the bearing cage is a through shaft bearing cage, and the limitation in claim 5 that the bearing cage is an input bearing cage.

A fourth issue is whether the combination of Glaze and Miller proposed by the Examiner satisfies the limitation in claims 6 and 7 that the seal be arranged between a bearing cage and the driven shaft. This issue turns on whether either reference teaches a cage.

A fifth issue is whether Appellant demonstrates that the Examiner erred in determining that it would have been obvious to use a lubricant with a GL5 additive as the second lubricant, as called for in claim 8, in light of the combined teachings of Glaze, Miller and Tersigni.

#### FINDINGS OF FACT

- FF1 Glaze teaches “a tandem rear axle assembly 20 including an interaxle front differential 22 driven through a drive shaft 24 and driving an intermediate drive shaft 26, which in turn drives a rear differential 28” (col. 2, l. 65 to col. 3, l. 3; fig. 1). Glaze emphasizes that the disclosed features of the invention “may be applied to various types of differentials, including a two-speed differential mechanisms and a single axle differential mechanism” (col. 3, ll. 6-8).
- FF2 Glaze shows a seal 76 at the forward portion of the input shaft 58 between the yoke and the differential housing 68 adjacent to the bearing assembly 72, 74 in the single rear differential (col. 3, ll. 32-35; fig. 2). Glaze likewise shows a first seal 202 in a similar location in the interaxle front differential (col. 5, ll. 55-57; fig. 5). Neither of these seals separates the axle housing into a first cavity housing the bearing assembly and a second cavity housing the gear assembly.
- FF3 Glaze lacks a second seal adjacent the pinion that separates the axle housing into a first cavity housing the bearing assembly and a second cavity housing the gear assembly.
- FF4 Glaze teaches lubricating both the gear assembly and the bearing assembly using a main sump 318 located adjacent the gear assembly in the interaxle front differential. According to Glaze, rotation of the

- gear assembly will cause lubricating fluid to be dispersed throughout the differential housing to lubricate both the interaxle differential and all bearings. (Col. 7, ll. 23-31).
- FF5 Miller teaches providing a pair of oil seals 50 and 52 to completely seal the bearing and retain bearing lubricant within the bearing cavity and keep out axle pinion lubricant (col. 3, ll. 12-15).
- FF6 Miller's first seal 52 is interposed between the pinion shaft and the bearing housing 24 at the end of the bearing assembly 20 opposite the end adjacent the pinion gear and, in particular, is disposed between a cone (inner race 36) and the bearing housing 24 (fig. 1).
- FF7 Miller's second seal 50 is interposed between the pinion shaft and the bearing housing 24 adjacent to the pinion and, in particular, is disposed between a cone (inner race 34) and the bearing housing 24 (fig. 1).
- FF8 Miller's bearing housing 24 is a "bearing cage."
- FF9 Miller teaches that lubrication oil for lubricating axle gears typically contains additives that have been shown to decrease bearing life (col. 1, ll. 13-18).
- FF10 Miller also teaches that debris generated by the axle gear systems can damage bearing life if allowed to pass continually through the bearing (col. 1, ll. 22-28).
- FF11 Miller's teachings (1) to provide a second seal 50 to seal the bearing assembly 20 from the gear assembly to keep the lubricant in each assembly segregated from the other assembly (FF5) and (2) that lubrication oil for lubricating axle gears contains additives that are undesirable for lubricating bearings (FF9), viewed together, suggest

that the lubricant for lubricating the gear assembly is of a different composition than the lubricant for lubricating the bearing assembly. Specifically, the bearing assembly lubricant does not have the additives of the gear assembly lubricant.

FF12 Miller's teachings are directed to bearing support systems for gear type power transmission systems generally (col. 1, ll. 4-5).

FF13 Lubricant containing GL5 additive is known for lubricating the pinion, ring, gear, and differential of heavy duty drive axles, but GL5 additive is known to be corrosive to bearings (Specification 1, ¶ 3).

FF14 Gear lubricants meeting American Petroleum Institute GL-5 standards were known in the art at the time of Appellant's invention for use in automotive gear units (Tersigni, col. 14, ll. 59-61).

### PRINCIPLES OF LAW

While there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness, "the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l. Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007).

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in

the same way, using the technique is obvious unless its actual application is beyond his or her skill.

*Id.*, at 1740. We must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.  
*Id.*

In determining whether the subject matter of a claim is obvious, “neither the particular motivation nor the avowed purpose of the [applicant] controls. What matters is the objective reach of the claim.” If the claim extends to what is obvious, it is unpatentable under § 103. “One of the ways in which [claimed] subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the [claims].” *Id.* at 1741-42.

Nonobviousness cannot be established by attacking the references individually when the rejection is predicated upon a combination of prior art disclosures. *See In re Merck & Co. Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

The selection of a known material based upon its suitability for the intended use is a design consideration within the skill of the art. *In re Leshin*, 277 F.2d 197, 199 (CCPA 1960).

## ANALYSIS

### *Claims 1, 2, 10, 11, and 14*

There is no dispute that Glaze lacks a seal separating the axle housing into a first cavity housing the bearing assembly and a second cavity housing

the gear assembly (FF2 and FF3). The Examiner combines the teachings of Miller with Glaze to address this limitation (Answer<sup>1</sup> 4).

Appellant argues that because Glaze does not discuss the driven shaft or any special lubrication concerns relating to its bearings, it is not clear why one of ordinary skill in the art would be motivated to modify Glaze (Appeal Br.<sup>2</sup> 6). This argument is not well founded. To the extent that Appellant asserts that we apply a rigid formula for obviousness that requires demonstration of a teaching, suggestion, or motivation, such a mandatory approach has been expressly rejected. *KSR*, 127 S. Ct. at 1741. Nevertheless, for the reasons that follow, the combination of Glaze and Miller proposed by the Examiner would pass such a rigid test.

In short, the motivation or suggestion for the modification is found in Miller. While Glaze may not express any concerns about lubricating both the gear assembly and the bearing assembly of a differential using a common lubricant (FF4), Miller does discuss concerns about using the same lubricant for lubricating both the gear assembly and the bearing assembly (FF9 and FF10). To address that problem, Miller teaches providing a pair of oil seals 50 and 52 to completely seal the bearing and retain bearing lubricant within the bearing cavity and keep out axle pinion lubricant (FF5). Miller also suggests using a lubricant for lubricating the gear assembly that is of a different composition than the lubricant for lubricating the bearing assembly (FF11). A person of ordinary skill in the art would have immediately appreciated that the use of gear assembly and bearing assembly

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<sup>1</sup> We refer herein to the Examiner's Answer ("Answer"), mailed June 5, 2007.

<sup>2</sup> We refer herein to the Appeal Brief ("Appeal Br."), filed January 16, 2007, and the Reply Brief ("Reply Br."), filed August 6, 2007.

lubricants of different compositions and the provision of first and second seals to seal the bearing assembly of Glaze to keep the gear assembly lubricant out of the bearing assembly as taught by Miller would likewise improve the differential assembly of Miller by increasing the life of the bearings. The person of ordinary skill in the art would have been prompted to modify the assembly of Glaze by providing first and second seals on the bearing assembly and using a gear assembly lubricant of a composition different than that of the bearing assembly lubricant as a known solution to a problem known in the art. Such a modification merely involves the predictable use of prior art elements together according to their established functions and thus appears well within the technical grasp of a person of ordinary skill in the art.

Appellant additionally asserts that Glaze teaches the use of the same lubricant in both cavities of the axle arrangement (Appeal Br. 6). This argument attacks Glaze in isolation, rather than the combination of Glaze and Miller proposed by the Examiner. As discussed above, Miller suggests the use of gear lubricants and bearing lubricants of different compositions (FF11). Moreover, as also discussed above, a person of ordinary skill in the art would have been prompted to apply this teaching to Glaze in order to address the known problems (FF9) presented by the use of a common lubricant for both the bearing assembly and the gear assembly.

In light of the above, Appellant's arguments do not persuade us that the Examiner erred in rejecting claim 1 as unpatentable over Glaze and Miller. We sustain the rejection as to claim 1, as well as claims 2, 10, 11, and 14, for which Appellant presents no separate arguments for patentability.

*Claims 3-5*

Claims 3-5 recite that the bearing cage is “a pinion bearing cage,” “a through shaft bearing cage,” and “an input bearing cage,” respectively. Appellant contends that to interpret “pinion,” “through shaft” and “input” as the same element “would ignore that the words have different plain meanings” (Reply Br. 2). Appellant urges that if claims 3-5 all are the same, then they should be rejected under 35 U.S.C. § 112 (Appeal Br. 7).

Appellant’s argument is not well reasoned. Claim limitations may have different scope and still be satisfied by the same prior art structure. In any event, we find that the teachings of both Glaze and Miller are directed to various types of differential assemblies (FF1 and FF12) and thus would be applicable to any of “pinion,” “through shaft” and “input” bearing assemblies.

In light of the above, Appellant fails to demonstrate error in the rejection of claims 3-5 as unpatentable over Glaze in view of Miller. The rejection is sustained as to these claims.

*Claims 6 and 7*

Appellant contends that Miller does not disclose the seal being arranged between the bearing cage and driven shaft, and specifically between the bearing cage and cone (Appeal Br. 7). In particular, Appellant asserts that nothing in Miller or Glaze requires the use of a cage (Reply Br. 2). We do not agree with Appellant’s argument. Miller teaches such an arrangement (FF7 and FF8).

Appellant fails to demonstrate error in the rejection of claims 6 and 7 as unpatentable over Glaze in view of Miller. The rejection is sustained as to claims 6 and 7.

*Claim 8*

The Examiner contends that it would have been obvious to use a lubricant containing a GL5 lubricant additive in the gear assembly of Glaze as modified in view of Miller so as to increase efficiency, reduce friction, and reduce corrosion of the axle assembly (Answer 4). Appellant argues that there is no teaching to modify Glaze or Miller to use a GL5 additive specifically. In particular, according to Appellant, Tersigni's mere mention of GL5 does not rise to the level of providing a motivation to modify either reference. (Reply Br. 2.)

Appellant's argument is not well founded. First, as mentioned above, the mandatory application of such a rigid formula requiring a showing of a teaching, suggestion, or motivation to establish obviousness has been expressly rejected. While there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness, the Examiner need not point to precise teachings directed to the specific subject matter of the claim. The record in this case clearly establishes that lubricants with GL5 additives were known in the art at the time of Appellant's invention for lubricating gears of heavy duty drive axles (FF13 and FF14). Therefore, the selection of a lubricant containing GL5 additive for lubricating the gear assembly of Glaze's axle assembly, as modified by Miller, is a matter of ordinary skill and common sense, not of innovation. There is no indication in the record that the use of a lubricant containing GL5 additive in the gear assembly of Glaze's modified axle assembly would yield unpredictable or unexpected results or be uniquely challenging to a person of ordinary skill in the art.

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For the above reasons, Appellant's argument does not demonstrate error in the Examiner's rejection of claim 8 as unpatentable over Glaze in view of Miller and Tersigni. We sustain the rejection.

### DECISION

The decision of the Examiner to reject claims 1-8, 10, 11, and 14 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

JRG

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